

SEQUENCE LISTING

<110> Duvick, Jon
Maddox, Joyce
Navarro Acevedo, Pedro
Simmons, Carl R.

<120> Maize Peroxidase Genes and Their Use for
Improving Plant Disease Resistance and Stalk Strength

<130> 35718/242052

<150> US 60/262,595

<151> 2001-01-18

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Arg Arg Asp Gly Leu Ala Pro Ala Ser Asn Ala Ala Val Leu Ala Ala
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ctc cca ccg ccg acg tcc aag gtg ccg acg ctg ctg tcc ttc ctg gcg 203
Leu Pro Pro Pro Thr Ser Lys Val Pro Thr Leu Leu Ser Phe Leu Ala
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aag atc aac ctg gac gtg acg gac ctg gtg gcg ctg tcg ggc ggg cac 251
Lys Ile Asn Leu Asp Val Thr Asp Leu Val Ala Leu Ser Gly Gly His
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acg gtg ggc atc gcg cac tgc ggc tcc ttc gac aac cgg ctg ttc ccg 299
Thr Val Gly Ile Ala His Cys Gly Ser Phe Asp Asn Arg Leu Phe Pro
70 75 80

acg cag gac ccg acg ctg aac aag ttc ttc gcg ggg cag ctg tac ccg 347
Thr Gln Asp Pro Thr Leu Asn Lys Phe Phe Ala Gly Gln Leu Tyr Arg

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Thr Pro Asn Ala Phe Asp Asn Lys Tyr Tyr Val Asp Leu Leu Asn Arg																														
115 120 125																														
gag ggc ctc ttc acg tcg gac cag gac ctg ctg acc aac gcc acc acg	491																													
Glu Gly Leu Phe Thr Ser Asp Gln Asp Leu Leu Thr Asn Ala Thr Thr																														
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cgc ccc atc gtc acg cgc ttc gcc gtc gac cag gac gcc ttc ttc gac	539																													
Arg Pro Ile Val Thr Arg Phe Ala Val Asp Gln Asp Ala Phe Phe Asp																														
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Gly Ser Gln Gly Gln Val Arg Ala Asn Cys Ser Ala Arg Asn Gly Ala																														
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Ala Ala Gly Asp Ser Asp Leu Pro Trp Ser Ser Val Val Ile Glu Thr																														
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gtc gcc gac gcc gcc ggt agc ctc gtg ctc tag ataataagca aataagtagt	736																													
Val Ala Asp Ala Ala Gly Ser Leu Val Leu *																														
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 Ala Lys Ile Asn Leu Asp Val Thr Asp Leu Val Ala Leu Ser Gly Gly
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 His Thr Val Gly Ile Ala His Cys Gly Ser Phe Asp Asn Arg Leu Phe
 65 70 75 80
 Pro Thr Gln Asp Pro Thr Leu Asn Lys Phe Phe Ala Gly Gln Leu Tyr
 85 90 95
 Arg Thr Cys Pro Thr Asn Ala Thr Val Asn Thr Thr Ala Asn Asp Val
 100 105 110

Arg Thr Pro Asn Ala Phe Asp Asn Lys Tyr Tyr Val Asp Leu Leu Asn
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 Arg Glu Gly Leu Phe Thr Ser Asp Gln Asp Leu Leu Thr Asn Ala Thr
 130 135 140
 Thr Arg Pro Ile Val Thr Arg Phe Ala Val Asp Gln Asp Ala Phe Phe
 145 150 155 160
 Asp Gln Phe Val Tyr Ser Tyr Val Lys Met Gly Gln Val Asn Val Leu
 165 170 175
 Thr Gly Ser Gln Gly Gln Val Arg Ala Asn Cys Ser Ala Arg Asn Gly
 180 185 190
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 Met Ala Ser Pro Thr Leu Met Gln Cys Leu Val Ala Val Ser
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 Ser Ser Cys Pro Asn Leu Gln Ser Ile Val Arg Ala Ala Met Thr Gln
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 Phe His Asp Cys Phe Val Gln Gly Cys Asp Gly Ser Ile Leu Leu Asp
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 Gly Val Val Ser Cys Ala Asp Ile Leu Ala Leu Ala Ala Arg Asp Gly

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Thr Asn Leu Leu Gly Gly Pro Thr Trp Ser Val Pro Leu Gly Arg Arg	
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Asp Ser Thr Thr Ala Ser Ala Ser Leu Ala Asn Ser Asn Pro Pro Pro	
145 150 155	
ccg acg gcc agc ctc ggc acg ctc atc tcc ctg ttc ggc agg cag ggc	588
Pro Thr Ala Ser Leu Gly Thr Leu Ile Ser Leu Phe Gly Arg Gln Gly	
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ctg tcg ccg cgc gac atg acg gcg ctg tcg ggc gcg cac acc atc ggg	636
Leu Ser Pro Arg Asp Met Thr Ala Leu Ser Gly Ala His Thr Ile Gly	
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Gln Ala Arg Cys Thr Thr Phe Arg Gly Arg Ile Tyr Gly Asp Thr Asp	
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Ile Asn Ala Ser Phe Ala Ala Leu Arg Gln Gln Thr Cys Pro Arg Ser	
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Gly Gly Asp Gly Asn Leu Ala Pro Ile Asp Val Gln Thr Pro Val Arg	
225 230 235	
ttc gac acg gcc tac ttc acc aac ctg ctg tcg cgg cgg ggc ctg ttc	828
Phe Asp Thr Ala Tyr Phe Thr Asn Leu Leu Ser Arg Arg Gly Leu Phe	
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His Ser Asp Gln Glu Leu Phe Asn Gly Gly Ser Gln Asp Ala Leu Val	
255 260 265 270	
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Arg Gln Tyr Ser Ala Ser Ala Ser Leu Phe Asn Ala Asp Phe Val Ala	
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Ala Met Ile Arg Met Gly Asn Val Gly Val Leu Thr Gly Thr Ala Gly	
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Gln Ile Arg Arg Asn Cys Arg Val Val Asn Ser *	
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 Ala Ser Glu Gln Arg Met Gly Ala Ser Leu Leu Arg Leu Phe Phe His
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 Asp Cys Phe Val Gln Gly Cys Asp Gly Ser Ile Leu Leu Asp Ala Gly
 65 70 75 80
 Gly Glu Lys Thr Ala Gly Pro Asn Leu Asn Ser Val Arg Gly Phe Glu
 85 90 95
 Val Ile Asp Thr Ile Lys Arg Asn Val Glu Ala Ala Cys Pro Gly Val
 100 105 110
 Val Ser Cys Ala Asp Ile Leu Ala Leu Ala Ala Arg Asp Gly Thr Asn
 115 120 125
 Leu Leu Gly Gly Pro Thr Trp Ser Val Pro Leu Gly Arg Arg Asp Ser
 130 135 140
 Thr Thr Ala Ser Ala Ser Leu Ala Asn Ser Asn Pro Pro Pro Pro Thr
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 Ala Ser Leu Gly Thr Leu Ile Ser Leu Phe Gly Arg Gln Gly Leu Ser
 165 170 175
 Pro Arg Asp Met Thr Ala Leu Ser Gly Ala His Thr Ile Gly Gln Ala
 180 185 190
 Arg Cys Thr Thr Phe Arg Gly Arg Ile Tyr Gly Asp Thr Asp Ile Asn
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 Ala Ser Phe Ala Ala Leu Arg Gln Gln Thr Cys Pro Arg Ser Gly Gly
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 Asp Gly Asn Leu Ala Pro Ile Asp Val Gln Thr Pro Val Arg Phe Asp
 225 230 235 240
 Thr Ala Tyr Phe Thr Asn Leu Leu Ser Arg Arg Gly Leu Phe His Ser
 245 250 255
 Asp Gln Glu Leu Phe Asn Gly Gly Ser Gln Asp Ala Leu Val Arg Gln
 260 265 270
 Tyr Ser Ala Ser Ala Ser Leu Phe Asn Ala Asp Phe Val Ala Ala Met
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Leu Thr Ala Lys Cys Ala Ser Asp Pro Ser Gly Asn Val Val Thr Gln
235 240 245

820 gtg ctg gac gtg cgc acc aac gcc ttc gac aac aag tac tac ttc
Val Leu Asp Val Arg Thr Pro Asn Ala Phe Asp Asn Lys Tyr Tyr Phe
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868 gac ctt atc gcc aag cag ggg ctc ttc aag tcc gac cag ggc ctc atc
Asp Leu Ile Ala Lys Gln Phe Lys Ser Asp Gln Gly Leu Ile
265 270 275 280

916 aac cac ccg gac acc aag cgc gcc acc cgc ttc ggc ctc aac cag
Asn His Pro Asp Thr Lys Arg Ala Thr Arg Phe Ala Leu Asn Gln
285 290 295

964 gcc gcc ttc ttc gac cag ttc gcc agc tcc atg gtc aag atg agc cag
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1012 atg gac atc ctc acc gcc agc gcc gga gag atc cgc cgc aac tgc tcc
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315 320 325

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Val Arg Asn Thr Ala Leu Gly Asp Val Ser Ser Ala Gln Leu Gln
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Thr Thr Ala Gly Asp Gln Gly Leu Ala Ala Asp Ala *
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Val Gln Gly Ile Val Arg Trp His Val Ala Gln Ala Leu Arg Arg Asp
50 55 60
Ile Gly Ile Ala Ala Gly Leu Ile Arg Ile Phe Phe His Asp Cys Phe
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Pro Gln Gly Cys Asp Ala Ser Val Leu Leu Ser Gly Ser Asn Ser Gln

Position	Residue	Sequence
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115	Ser Cys Ala Asp	Ile Thr Thr Leu Ala Thr Arg Asp Ala Val Val Ala
130	Ser Gly Gly	Pro Phe Gln Val Pro Leu Gly Arg Asp Gly Leu
145	Ser Gly Gly	Pro Phe Gln Val Pro Leu Gly Arg Asp Gly Leu
160	Ala Pro Ala Ser	Ser Asp Leu Val Gly Thr Leu Pro Ala Pro Phe
175	Ala Pro Ala Ser	Ser Asp Leu Val Gly Thr Leu Pro Ala Pro Phe
190	Ala Asp Leu Val	Ala Leu Ser Ile Gln Lys Thr Val Arg Gly His
205	Cys Val Ser Phe	Ser Asp Arg Leu Pro Asn Ala Asp Gly Thr
220	Met Asp Pro Ala	Phe Arg Gln Leu Thr Ala Lys Cys Ala Ser Asp
235	Pro Ser Gly Asn	Val Val Leu Asp Val Arg Thr Pro Asn
250	Ala Phe Asp Asn	Lys Thr Tyr Phe Asp Leu Ile Ala Lys Gln Gly Leu
265	Phe Lys Ser Asp	Gln Gly Leu Ile Asn His Pro Asp Thr Lys Arg Ala
280	Ala Thr Arg Phe	Ala Leu Asn Gln Ala Phe Phe Asp Gln Phe Ala
295	Arg Ser Met Val	Lys Met Ser Gln Met Asp Ile Leu Thr Gly Ser Ala
310	Gly Gln Ile Arg	Arg Asn Cys Ser Val Arg Asn Thr Ala Leu Gly Asp
325	Val Ser Ser Ser	Ser Ser Ser Thr Ala Gly Asp Gln Gly Leu
340	Ala Ala Asp Ala	
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[illegible]

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270	Arg	Arg	Asp	Asn	Thr	Thr	Gln	Leu	Gln	Met	Val	Pro	275
275	Arg	Arg	Gag	agg	gag	gag	gag	gag	gag	gag	gag	gag	280
285	Ala	Phe	Gly	Thr	Ala	Tyr	Tyr	Gly	Leu	Val	Ala	Gln	295
285	Ala	Phe	Gly	Thr	Ala	Tyr	Tyr	Gly	Leu	Val	Ala	Gln	295
300	Phe	His	Ser	Asp	Gln	Ala	Leu	Leu	Arg	Asn	Gly	Gln	310
305	Phe	His	Ser	Asp	Gln	Ala	Leu	Leu	Arg	Asn	Gly	Gln	310
315	Val	Tyr	Arg	Tyr	Arg	Asp	Ala	Pro	Ser	Gln	Ala	Pro	325
315	Val	Tyr	Arg	Tyr	Arg	Asp	Ala	Pro	Ser	Gln	Ala	Pro	325
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345	Ala	Gln	Gly	Gln	Ile	Arg	Lys	Arg	Cys	Ala	Phe	Val	355
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462	ctc cac ttc cat gac tgc ttc gtc aag ggc tgc gac gcg tgc atc ctg	Leu His Phe His Asp Cys Phe Val Lys Gly Cys Asp Ala Ser Ile Leu	90	95	100
510	ctg gac acc gcc cag agc gag aag gtc gac ggc ggc ggc ggc ggc ggc	Leu Asp Thr Ala Gln Ser Gln Lys Thr Ala Ala Pro Asn Leu Ser Val	105	110	115
558	ggc ggg tac gag gtc atc gac ggc atc aag ggc cag ctg gag agg gcg	Gly Gly Tyr Gln Val Ile Asp Ala Ile Lys Ala Gln Leu Gln Arg Ala	120	125	130
606	tgc ccg ggc gtc gtc gtc gtc gtc gtc gtc gtc gtc gtc gtc gtc gtc	Cys Pro Gly Val Val Ser Cys Ala Asp Ile Val Ala Leu Ala Ala Arg	140	145	150
654	gac gcc gtc tgc tac cag ttc aag ggc tgc ctg tgg cag gtc gag acg	Asp Ala Val Ser Tyr Gln Phe Lys Ala Ser Leu Trp Gln Val Gln Thr	155	160	165
702	ggg cgg cgg gac ggc agc gtc gtc gtc gtc gtc gtc gtc gtc gtc gtc	Gly Arg Arg Asp Gly Thr Val Ser Leu Ala Ser Asn Thr Gly Ala Leu	170	175	180
750	ccg tgc ccc ttc ggc ggc ttc ggc ggc ttc ggc ggc ggc ggc ggc ggc	Pro Ser Pro Phe Ala Gly Phe Ala Gly Leu Leu Gln Ser Phe Ser Asp	185	190	195
798	cgg ggg ctg aac ctg acg gac ctc gtc ggc ggc ggc ggc ggc ggc ggc	Arg Gly Leu Asn Leu Thr Asp Leu Val Ala Leu Ser Gly Ala His Thr	200	205	210
846	atc ggc gtc gca agc tgc tcc agc gtc acc cgc ctg ggc ctg tac cag	Ile Gly Val Ala Ser Cys Ser Ser Val Thr Pro Arg Leu Tyr Gln Gly	220	225	230
894	aac gcc agc agc gtc gac cgc ctg ctg gac tgc ggc tac ggc cgg acg	Asn Ala Ser Ser Val Asp Pro Leu Leu Asp Ser Ala Tyr Ala Arg Thr	235	240	245
942	ctc atg tgc tgc tgc tgc tgc tgc tgc tgc tgc tgc tgc tgc tgc tgc	Leu Met Ser Ser Cys Pro Asn Pro Ser Pro Ala Ser Ala Thr Val Ala	250	255	260
990	ctg gac ggc ggc ggc ggc ggc ggc ggc ggc ggc ggc ggc ggc ggc	Leu Asp Gly Gly Thr Pro Phe Arg ttc cgg ttc gac agc agt tac tac	265	270	275

1038	gtg	Val	280
	cag	Gln	
	cag	Gln	
	aag	Lys	
	cag	Gln	285
	gcy	Gly	
	acg	Thr	
	ctg	Leu	
	gcc	Ala	
	tcc	Ser	290
	gac	Asp	
	gcc	Ala	
	gcy	Ala	
	ctg	Leu	
	gcy	Ala	295
	cag	Gln	

1086	aac gcc gcc gcc gcc gcy cag atg gtg gcc gac ctc acc aac ccc atc aag	Asn Ala Ala Ala Ala Ala Gln Met Val Ala Asp Leu Thr Asn Pro Ile Lys	300	305	310
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1134

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Val Leu Thr Gly Ala Asn Gly Gln Ile Arg Lys Gln Cys Arg Gln Val	
330	
335	
340	

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Asn Thr Ser * 345

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1295	cggcttcggc	tcgcgcgaca	tcaaatatat	ttcgccccgc	cgcggtgatt	gagggccctc
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Asp	Gly	Ala	Ala	Ala	Trp	Cys	Trp	Trp	Trp	Val	Ala	Val	Val	Leu	Leu

Leu Gly	His	Leu	Pro	Ser	Cys	Ala	Arg	Ala	Gly	Leu	Leu	Glu	Ser	Asn	
35									40						
Pro	Gly	Leu	Ala	Tyr	Asn	Phe	Tyr	Lys	Asn	Ser	Cys	Pro	Ser	Val	Asp

Ser Ile Val Arg Ser Val Thr Trp Ala Gln Val Ala Ala Asn Pro Ala	65	70	75	80
Leu Pro Ala Arg Leu Leu Arg Leu His Phe His Asp Cys Phe Val Lys				

Gly Cys Asp Ala Ser Ile Leu Leu Asp Thr Ala Gln Ser Gln Lys Thr	100	105	110
Ala Ala Pro Asn Leu Ser Val Gly Gly Tyr Gln Val Ile Asp Ala Ile			

Lys Ala	Gln Leu	Glu Arg	Ala Cys	Pro Gly	Val Val	Ser Cys	Ala Asp	130
Ile Val	Ala Leu	Ala Ala	Arg Asp	Ala Val	Ser Tyr	Gln Phe	Lys Ala	135
								140

Ser	Leu	Trp	Gln	Val	Glu	Thr	Gly	Arg	Arg	Asp	Gly	Thr	Val	Ser	Leu
165															
170															
Ala	Ser	Asn	Thr	Gly	Ala	Leu	Pro	Ser	Pro	phe	Ala	Gly	phe	Ala	Gly

Leu Leu Gln Ser Phe Ser Asp Arg Gly Leu Asn Leu Thr Asp Leu Val

13

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[illegible]

<210> 11

<211> 1183

<212> DNA

<213> Zea mays

<220>

<221> CDS

<222> (60) .. (1079)

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3 ataaccatcac catgacttga actaagcgat acagcaaac tgttggagct cagctgac

[illegible]

203 gtc ggt ttc ttc tac gag cac tgc tgc cca cag gcc gag gac atc gtc cgc
Val Gly Phe Tyr Glu His Ser Cys Pro Gln Ala Gln Asp Ile Val Arg 45
35 40

[illegible]

299 ctc atc cgc atg cac ttc cac gac tgc ttc gtc cgg ggc tgc gac ggc
Leu Ile Arg Met His phe His Asp Cys phe Val Arg Gly Cys Asp Gly 80

347 tcc atc ctc atc aac tcc acg ccy gac aac aag gcc gag aag gac tcc
Ser Ile Leu Ile Asn Ser Thr Pro Asp Asn Lys Ala Gln Lys Asp Ser 95

14

Val Ala Asn Asn Pro Ser Met Arg Gly Phe Asp Val Val Asp Ala	100	105	110
aag gcc gtc ctc gag gcc cac tgc ccg cgc acc gtc tcc tgc gcc gag	115	120	125
Lys Ala Val Leu Gln Ala His Cys Pro Arg Thr Val Ser Cys Ala Asp	130	135	140
atc gtc ggc ttc gca gcc cgt gac agc gcc tac ctc gcc ggc ggc ctg	145	150	155
Ile Val Ala Phe Ala Ala Arg Asp Ser Ala Tyr Leu Ala Gly Gly Leu	160	165	170
gat gag gtc ctc gac aac aat gtc cct gcc ccg act gac gag gtc gac	175	180	185
asp gln val leu asp asn asn val pro ala pro thr asp gln val asp	190	195	200
gag ctc atc gag agc ttc aag cgc aag ggc ctc aac gcc gag gac atg	205	210	215
Glu Leu Ile Gln Ser Phe Lys Arg Lys Gly Leu Asn Ala Thr Ile Ser	220	225	230
gtc acg ctc tct ggc gcc cac acc atc ggc cgc tcc cac tgc tcc tcg	235	240	245
Val Thr Leu Ser Gly Ala His Thr Ile Gly Arg Ser Ser His Cys Ser	250	255	260
ttc acg gag cgc ttc tac aac ttc agc ggc ggc cag atg gac gcc acc	265	270	275
Phe Thr Gln Arg Leu Tyr Asn Phe Ser Gly Gln Leu Gly Arg Thr Asp	280	285	290
ccg tcc ctc gac cct gcc tac gct gag cac ctc aag atg cgc tgc cca	295	300	305
Pro Ser Leu Asp Pro Ala Tyr Ala Gln His Leu Lys Met Arg Cys Pro	310	315	320
gag ctc atc gag agc ttc aag cgc aag ggc aag atg ggc aag gtc cag	325	330	335
gln val lys phe ala lys ala lys met gly lys val gln val	340	345	350
ctc acc ggc gac gag gga gag atc agg gag aag tgc ttc gcc gtc aac	355	360	365
Leu Thr Gly Asp Gln Gly Gln Ile Arg Gln Lys Cys Phe Ala Val Asn	370	375	380

cca cac tac tag tgcgtcaagtt tagctaatta cccgcggaat tatgtttgtt
Pro His Tyr *

tatacgttcc atcacatcaac attatgtaga gtgttttcg ttctaataaa aaaaaaaa
1179
1183

325 330 335

<210> 12
<211> 339
<212> PRT
<213> Zaa may

<400> 12

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Ala Ser Ser Ser Val Ala Ser His Ala Ser Pro Pro Gly Lys Leu Gln
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Val Gly Phe Tyr Gln His Ser Cys Pro Gln Ala Gln Asp Ile Val Arg
35 40 45

Asn Ala Val Arg Arg Gly Ile Ala Arg Gln Pro Gly Val Gly Ala Gly
50 55 60

Leu Ile Arg Met His Phe His Asp Cys Phe Val Arg Gly Cys Asp Gly
65 70 75 80

Ser Ile Leu Ile Asn Ser Thr Pro Asp Asn Lys Ala Gln Lys Asp Ser
85 90 95

Val Ala Asn Asn Pro Ser Met Arg Gly Phe Asp Val Val Asp Asp Ala
100 105 110

Lys Ala Val Leu Gln Ala His Cys Pro Arg Thr Val Ser Cys Ala Asp
115 120 125

Ile Val Ala Phe Ala Arg Asp Ser Ala Tyr Leu Ala Gly Gly Leu
130 135 140

Asp Tyr Lys Val Pro Ser Gly Arg Asp Gly Arg Val Ser Lys Gln
145 150 155 160

Asp Gln Val Leu Asp Asn Asn Val Pro Ala Pro Thr Asp Gln Val Asp
165 170 175

Gln Leu Ile Gln Ser Phe Lys Arg Lys Gly Leu Asn Ala Asp Asp Met
180 185 190 195

Val Thr Leu Ser Gly Ala His Thr Ile Gly Arg Ser His Cys Ser Ser
200 205 210

Phe Thr Gln Arg Leu Tyr Asn Phe Ser Gly Gln Leu Gly Arg Thr Asp
215 220 225

Pro Ser Leu Asp Pro Ala Tyr Ala Gln His Leu Lys Met Arg Cys Pro
230 235 240

Trp Pro Ser Ser Ser Asn Asp Gln Met Asp Pro Thr Val Val Pro Leu Asp
245 250 255

Pro Val Thr Thr Pro Ala Thr Phe Asp Asn Gln Tyr Tyr Lys Asn Val Leu
260 265 270

Ala His Lys Val Leu Phe Ile Ser Asp Asn Thr Leu Leu Gln Asn Pro
275 280 285

Trp Thr Ala Gly Met Val His Phe Asn Ala Ala Val Gln Lys Ala Trp
290 295 300

Gln Val Lys Phe Ala Lys Ala Met Val Lys Met Gly Lys Val Gln Val
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Leu Thr Gly Asp Gln Gly Gln Ile Arg Gln Lys Cys Phe Ala Val Asn
325 330 335

Pro His Tyr

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<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (142)...(1185)

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tgcagcgag tgtgcccgt ctcggaacag cgcggaccac cagaagctgc gcgtccgtgc
cccaaccctc cctctctatc c atg gcg gtc ccc cgc ggg tgc ctc ggg ctc
Met Ala Val Pro Arg Gly Cys Leu Gly Leu
1
5
10

ccc ctg gtc gcc gtc ctc ctc gtc tcc ctc tgc cgc ggc cag gcg gcg
Pro Leu Val Ala Val Leu Ala Ser Leu Cys Arg Gly Gln Ala Ala
15
20
25

gtg agg gag ctc aag gtc ggg tac tac gcc gag acg tgc ccg gag gcc
Val Arg Gln Leu Lys Val Gly Tyr Tyr Ala Gln Thr Cys Pro Gln Ala
30
35
40

gag gac atc gtc cgt gag acc atg gcg cgc ggc ggc gca cgc gag gcc
Glu Asp Ile Val Arg Gln Thr Met Ala Arg Ala Arg Gln Ala
45
50
55

cgc agc gtc gcc tcc gtc atg cgc ctc cag ttc cac gac tgc ttc gtc
Arg Ser Val Ala Ser Val Met Arg Leu Gln Phe His Asp Cys Phe Val
60
65
70

aac ggg tgc gag ggc tgc gtc atg gag gcc agc cgc agc cgc agc atg ccc
Asn Gly Cys Asp Gly Ser Val Leu Met Asp Ala Thr Pro Thr Met Pro
75
80
85
90

ggc gag aag gat ggc ctc tcc aac atc aac tcc ctc gtc tgc ttc gag
Gly Gln Lys Asp Ala Leu Ser Asn Ile Asn Ser Leu Arg Ser Phe Gln
95
100
105

gtc gtc gag gac gag atc aag gag gac ggc ctc gag gag ggc tgc ccc gga gtc
Val Val Asp Gln Ile Lys Asp Ala Leu Gln Gln Arg Cys Pro Gly Val
110
115
120

gtc tcc tgc gcc gac atc gtc atc atg gcc gcc ggc gac ggc gtc gtc
Val Ser Cys Ala Asp Ile Val Ile Met Ala Ala Arg Asp Ala Val Val
125
130
135

ctg acc ggt ggg cct aac tgg gag gtc cgc ggc ggc ggc gag gac agc
Leu Thr Gly Gly Pro Asn Trp Gln Val Arg Leu Gly Arg Gln Asp Ser
140
145
150

atg acg gcg agc cag gag gac gcg gac aac atc atg ccg agc ccg cgc
17

1185 1186 1187 1188 1189 1190 1191 1192 1193 1194 1195 1196 1197 1198 1199 1200

155	Met Thr Ala Ser Gln Gln	160	Arg Pro Ser Pro Arg
170		165	
699	Gca aac gcg agc gct ctc atc cgg ctc ttc gcg ggg ctc aac ctc agc	180	Ala Asn Ala Ser Ile Arg Leu Phe Ala Gly Leu Asn Leu Ser
747	Gtc acc gac ctg gtc gcg ctc ttc ggc ggc ttc cac tcc atc ggc gag gcc	195	
795	Gtc tgc ttc tcc atc gtc ttc cgc ctc tac aac gac tct gga tcc ggc	200	
	Arg Cys Phe Ser Ile Val Phe Arg Leu Tyr Asn Gln Ser Gly Ser Gly	215	
843	Cgc ccc gac ccg cac atg gac acc gcc tac cgc cgc tcc gac gca	230	
	Arg Pro Asp Pro His Met Asp Thr Ala Tyr Arg Arg Ser Leu Asp Ala	245	
891	Ctc tgc ccc aag ggc ggc gac gag gtc acg gga ggc cta gac gcc	250	
	Leu Cys Pro Lys Gly Asp Gln Val Thr Gly Leu Asp Ala	265	
939	Acc cca cgc gtc ttc gac aac cag tac ttc gag gac ctc gtc ggc ctc	280	
	Thr Pro Arg Val Phe Asp Asn Gln Tyr Phe Gln Asp Leu Val Ala Leu	295	
987	Cgc ggc ttc ctc aac tcc gac cag acg ctc ttc tct gac aac acc agg	310	
	Arg Gly Phe Leu Asn Ser Asp Gln Thr Leu Phe Ser Asp Asn Thr Arg	325	
1035	Acc cgt cgc gtc gtc gac cgc atc agc aag gac cag gac gcc ttc ttc	340	
	Thr Arg Arg Val Val Gln Arg Leu Ser Lys Asp Gln Asp Ala Phe Phe	355	
1083	Arg ggc ttc atc gag ggc atg ata aag atg ggc gag ctc caa aac ccc	370	
	Arg Ala Phe Ile Gln Gly Met Ile Lys Met Gly Gln Leu Gln Asn Pro	385	
1131	Arg aaa ggc gag ata cgc aac tgt cgc gtc gct aac aac tcc ccg	400	
	Arg Lys Gly Gln Ile Arg Arg Asn Cys Arg Val Ala Asn Asn Ser Pro	415	
1179	Tgc caa cca agc agc ggc atg gcg tcc gga cag tcc aca tct gag ctc	430	
	Trp Gln Pro Arg Thr Gly Met Ala Ser Gly Gln Ser Thr Ser Gln Leu	445	
1235	Cgg tga tgaagtgtgt gtttcagaag aaatcgagcc ctgatatgtt actaatatgt	460	
	Arg tga tgaagtgtgt gtttcagaag aaatcgagcc ctgatatgtt actaatatgt	475	
1295	Tgacatgcat tgtgttttt ttgttcgtgt gtaagttttg cactaccta tggctgtgt	490	
1355	gcccgaagctg cgctcatgc tgacgtgggg aataatgag acattgtgcc ttagctccaa	505	
1407	tacagtccaa tatattatc ctttaaaaaa aaaaaaaaaa	520	

<212> PRT
<213> Zea mays

<400> 14
Met Ala Val Pro Arg Gly Cys Leu Gly Leu Pro Leu Val Ala Val Leu
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Leu Ala Ser Leu Cys Arg Gly Gln Ala Val Arg Gln Lys Val
20 25 30
Gly Tyr Tyr Ala Gln Thr Cys Pro Gln Ala Gln Asp Ile Val Arg Gln
35 40 45
Thr Met Ala Arg Ala Arg Gln Ala Arg Ser Val Ala Ser Val
50 55
Met Arg Leu Gln Phe His Asp Cys Phe Val Asn Gly Cys Asp Gly Ser
60 65
Val Leu Met Asp Ala Thr Pro Thr Met Pro Gly Gln Lys Asp Ala Leu
70 75 80
Val Leu Met Asp Ala Thr Pro Thr Met Pro Gly Gln Lys Asp Ala Leu
85 90 95
Ser Asn Ile Asn Ser Leu Arg Ser Phe Gln Val Val Asp Gln Ile Lys
100 105
Asp Ala Leu Gln Arg Cys Pro Gly Val Val Ser Cys Ala Asp Ile
110 115
Val Ile Met Ala Ala Arg Asp Ala Val Leu Thr Gly Gly Pro Asn
120 125
Trp Gln Val Arg Leu Gly Arg Gln Asp Ser Met Thr Ala Ser Gln Gln
130 135 140
Asp Ala Asp Asn Ile Met Pro Ser Pro Arg Ala Asn Ala Ser Ala Leu
145 150 155
Ile Arg Leu Phe Ala Gly Leu Asn Leu Ser Val Thr Asp Leu Val Ala
160 165 170 175
Leu Ser Gly Ser His Ser Ile Gly Gln Ala Arg Cys Phe Ser Ile Val
180 185 190
Phe Arg Leu Tyr Asn Gln Ser Gly Ser Gly Arg Pro Asp Pro His Met
195 200 205
Asp Thr Ala Tyr Arg Arg Ser Leu Asp Ala Thr Pro Arg Val Phe Asp
210 215 220 225 230 235 240 245 250 255
Asn Gln Tyr Phe Gln Asp Leu Val Ala Leu Arg Gly Phe Leu Asn Ser
260 265 270
Asp Gln Thr Leu Phe Ser Asp Asn Thr Arg Thr Arg Arg Val Val Gln
275 280 285
Arg Leu Ser Lys Asp Gln Asp Ala Phe Phe Arg Ala Phe Ile Gln Gly
290 295 300
Met Ile Lys Met Gly Gln Leu Asn Pro Arg Lys Gly Gln Ile Arg
305 310 315 320 325
Arg Asn Cys Arg Val Ala Asn Ser Pro Trp Gln Pro Arg Thr Gly
330 335
Met Ala Ser Gly Gln Ser Thr Ser Gln Leu Arg 340 345

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<212> DNA
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<222> (315) .. (491)

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<222> (87) .. (1175)  
(511)
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aaatlaagca aagcatagcg acagcc atg gct acc tcc tct ggt tct tgc ctt
113
Met Ala Thr Ser Gly Ser Cys Leu
5

[illegible]

257	agg gcg atg tcc acc atc agc agc ggc gty aac tcc gcc gty gcg cag	45	Ser Ala Met Ser Thr Ile Ser Ser Ser Gly Val Asn Ser Ala Val Ala Gln	50	55
-----	---	----	---	----	----

305	cag gct cgt gty ggg gcy tcy ctc cgg ctc cac ttc cac gac tgc gln ala arg val gly ala ser leu leu arg leu his phe his asp cys	60	75	80	85
353	ttc gtc caa ggc tgc gac ggc tcc att cty cty aac gac acg tcc ggg phe val gln gly cys asp ala ser ile leu leu asn asp thr ser gly	75	80	85	
401	gag cag acc cag ccg ccg aac cta act cty aac ccg agg gcc ttc gac gln gln thr gln pro pro asn leu thr leu asn pro arg ala phe asp	90	95	100	105
449	gtc gtc aac agc atc aag gcy cag gty gag gcy gcy tgc ccg ggc gtc val val asn ser ile lys ala gln val gln ala cys pro gly val	110	115	120	
497	gtc tcc tgc gcc gac atc ctc gcc gtc gcc ggc ggc ggc gac gga gtt gtc val ser cys ala asp ile leu ala val ala arg asp gly val val	125	130	135	
545	gcy ctc ggc ggc ggc ggc cct ccy tcy acc gty ctt cty ggc aga agg gac tcy ala leu gly gly pro ser trp thr val leu leu gly arg arg asp ser	140	145	150	
593	acc ggt tcy ttc cct agc cag aca agc gac ctc cca cct ccy acg tcy thr gly ser phe pro ser gln thr ser asp leu pro pro thr ser	155	160	165	
641	agc ctc caa gca cty tta gcc gcy tac agc aag aag aac ctc gac gcy ser leu gln ala leu leu ala ala tyr ser lys lys asn leu asp ala	170	175	180	185
689	acc gac atg gtc gct ctc tca ggc gct cac aca atc ggc cag gcc cag thr asp met val ala leu ser gly ala his thr ile gly gln ala gln	190	195	200	
737	tgc tcy agc ttc aac gcc cac atc tac aac gac agc aac atc aac gcy cys ser ser phe asn gly his ile tyr asn asp thr asn ile asn ala	205	210	215	
785	gcc ttc gcy agc tcy ctc aag gcc aac tgc ccc atg tcc ggc ggc agc ala phe ala thr ser leu lys ala asn cys pro met ser gly gly ser	220	225	230	
833	agc cty gcy ccg cty gac acc atg acc ccg acc gty ttc gac aac gac ser leu ala pro leu asp thr met thr pro thr val phe asp asn asp	235	240	245	
881	tac tac aag aac cty cty cty cag aag ggg cty cty gac tcy gac cag tyr tyr lys asn leu leu ser gln lys gly leu leu his ser asp gln	250	255	260	265
929	gag cty ttc aac aac gcc agc agc agc agc agc agc agc agc agc agc gln leu phe asn asn gly ser thr asp ser thr val ser asn phe ala	270	275	280	

[illegible]

405	gag gcg gag aag gac gcg gcc	ccc aac ctg acg ctg ggc ttc ggc	Glu Ala Glu Lys Asp Ala Pro Asn Leu Thr Leu Arg Gly Phe Gly	85
				70
				75
				80
453	ttc atc gac cgc atc aag gcg ctg ctg gac gac ggc ggc ggc ggc	Phe Ile Asp Arg Ile Lys Ala Leu Leu Glu Lys Glu Cys Pro Gly Val		100
				105
				110
				115
501	gtg tcc tgc ggc gac atc gtc ggc ggc ggc ggc ggc ggc ggc ggc	Val Ser Cys Ala Asp Ile Val Ala Leu Ala Arg Asp Ser Val Gly		120
				125
				130
549	gtc atc ggc ggc ggc ggc ggc ggc ggc ggc ggc ggc ggc ggc ggc	Val Ile Gly Gly Pro Phe Trp Ser Val Pro Thr Gly Arg Asp Gly		135
				140
				145
597	acc gtc tcc atc aag cag gag ggc ctg gac cag atc ccc gcg ccc acc	Thr Val Ser Ile Lys Glu Ala Leu Asp Glu Ile Pro Ala Pro Thr		150
				155
				160
645	atg aac ttc acc caa ctc ctc cag tcc ttc, cag aac aag agc ctc aac	Met Asn Phe Thr Glu Leu Leu Glu Ser Phe Glu Asn Lys Ser Leu Asn		165
				170
				175
693	ctc gcc gac ctc gtc tgg ctc tca ggc gct cac acg atc ggc atc tcc	Leu Ala Asp Leu Val Trp Leu Ser Gly Ala His Thr Ile Gly Ile Ser		180
				185
				190
				195
741	caa tgc aac tcc ttc agc gag cgc ctg tac aac ttc acg ggc ggc ggc	Gln Cys Asn Ser Phe Ser Glu Arg Leu Tyr Asn Phe Thr Gly Arg Gly		200
				205
				210
789	ggg ccc gac gac gac gac gac gac gac gac gac gac gac gac gac	Gly Pro Asp Ala Asp Pro Ser Leu Asp Pro Leu Tyr Ala Ala Lys		215
				220
				225
837	ttg cgg ctc aag tgc aag acg acg ctg acg gac aac acg acg atc gtc gag	Leu Arg Leu Lys Cys Lys Thr Leu Thr Asp Asn Thr Thr Ile Val Glu		230
				235
				240
885	atg gac ccc ggc agc ttc cgc acc ttc gac ctg agc tac tac cgc ggc	Met Asp Pro Gly Ser Phe Arg Thr Phe Asp Leu Ser Tyr Tyr Arg Gly		245
				250
				255
933	gtg ctc aag cgg cgg ggc ctg ttc cag tcc gac ggc ggc ggc ggc ggc	Val Leu Lys Arg Arg Gly Leu Phe Glu Ser Asp Ala Ala Leu Ile Thr		260
				265
				270
				275
981	gac gcc gcc tcc aag gcc gac atc ctg agc gtc atc aac gcg cgc ccc	Asp Ala Ala Ser Lys Ala Asp Ile Leu Ser Val Ile Asn Ala Pro Pro		280
				285
				290
1029	gag gtc ttc ttc cag gtc ttc gcg ggc tcc atg gtc aag atg ggc gcc	Glu Val Phe Phe Glu Val Phe Ala Gly Ser Met Val Lys Met Gly Ala		295

1077	atc gag gtc aag acc ggc tcc gag ggc gag atc aag aag cac tgc gcc	1077
Ile Glu Val Lys Thr Gly Ser Glu Gly Glu Ile Arg Lys His Cys Ala	310	320
Leu Val Asn Lys His *	315	325
ctc gtc aac aag cac tag gcggcggaat tcatgcygga gatggtccca	1125	
Leu Val Asn Lys His	1125	
1185	ttgctcgcaaaaacccct gtgagagacaca caaatgctc tgcattctgca ggcgtgtcg	1185
1245	tcacattggt ggaagtagta catcggtgca tggattatc gtgttttaac ttgtagcttc	1245
1305	agttcatctc gttctctgta ttcttttggt tctcttcctc ttgttttatc atgagtagtg	1305
1365	agggtttct gtttatctc ctggttcagc tgaacacatg taacatgtaa ggtgcgcgtt	1365
1425	ttgtctctgt gatctctgca actgattta tttaattgga tggatatcat ggagatatga	1425
1467	tcatgataat aacaataagg tgaattacaaa aaaaaaaa aa	1467
<210> 19		
<211> 328		
<212> PRT		
<213> Zea mays		
<400> 19		
Met Val Arg Arg Thr Val Leu Ala Ala Leu Val Ala Ala Leu	1	15
Ala Gly Gly Ala Arg Ala Glu Leu Lys Glu Gly Phe Tyr Asp Tyr Ser	20	30
Cys Pro Glu Ala Glu Lys Ile Val Lys Asp Tyr Val Lys Ala His Ile	35	45
Pro His Ala Pro Asp Val Ala Ser Thr Leu Leu Arg Thr His Phe His	50	60
Asp Cys Phe Val Arg Gly Cys Asp Ala Ser Val Leu Leu Asn Ala Thr	65	75
Gly Gly Ser Glu Ala Glu Lys Asp Ala Ala Pro Asn Leu Thr Leu Arg	85	95
Gly Phe Gly Phe Ile Asp Arg Ile Lys Ala Leu Leu Glu Lys Glu Cys	100	110
Pro Gly Val Val Ser Cys Ala Asp Ile Val Ala Leu Ala Arg Asp	115	125
Ser Val Gly Val Ile Gly Gly Pro Phe Trp Ser Val Pro Thr Gly Arg	130	140
Arg Asp Gly Thr Val Ser Ile Lys Glu Glu Ala Leu Asp Glu Ile Pro	145	160
Ala Pro Thr Met Asn Phe Thr Glu Leu Leu Glu Ser Phe Glu Asn Lys	165	175
Ser Leu Asn Leu Ala Asp Leu Val Trp Leu Ser Gly Ala His Thr Ile	180	190
Gly Ile Ser Glu Cys Asn Ser Phe Ser Glu Arg Leu Tyr Asn Phe Thr	195	205
Gly Arg Gly Gly Pro Asp Ala Asp Pro Ser Leu Asp Pro Leu Tyr	210	220
Ala Ala Lys Leu Arg Leu Lys Cys Lys Thr Leu Thr Asp Asn Thr Thr	225	235
Ile Val Glu Met Asp Pro Gly Ser Phe Arg Thr Phe Asp Leu Ser Tyr	245	255
Tyr Arg Gly Val Leu Lys Arg Gly Leu	260	270

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<212> PRT
<213> Zea mays

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Ser Ala Ala Gly Ala Ala Gly Leu Asp Met Asn Phe Tyr Gly Ser Thr
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Cys Pro Arg Val Glu Ala Ile Val Lys Glu Glu Met Val Ala Thr Leu
35
Lys Ala Ala Pro Thr Leu Ala Gly Pro Leu Leu Arg Leu His Phe His
50
Asp Cys Phe Val Arg Gly Cys Asp Ala Ser Val Leu Leu Asp Ser Thr
65
Pro Thr Ser Thr Ala Glu Lys Asp Ala Thr Pro Asn Leu Thr Leu Arg
85
Gly Phe Gly Ser Val Glu Arg Val Lys Asp Arg Leu Glu Ala Cys
100
Pro Gly Asn Val Ser Cys Ala Asp Val Leu Ala Leu Met Ala Arg Asp
115
Ala Val Val Leu Ala Asn Gly Pro Ser Trp Pro Val Ala Leu Gly Arg
130
Arg Tyr Gly Arg Val Ser Leu Ala Asn Glu Thr Asn Glu Leu Pro Pro
145
Pro Thr Ala Asn Phe Thr Arg Leu Val Ser Met Phe Ala Ala Lys Gly
165
Leu Ser Val Arg Asp Leu Val Val Leu Ser Gly Gly His Thr Leu Gly
180
Thr Ala His Cys Asn Leu Phe Ser Asp Arg Leu Tyr Asn Phe Thr Gly
195
Ala Asn Ser Leu Ala Asp Val Asp Pro Ala Leu Asp Ala Ala Tyr Leu
210
Ala Arg Leu Arg Ser Arg Cys Arg Ser Leu Ala Asp Asn Thr Thr Leu
225
Asn Glu Met Asp Pro Gly Ser Phe Leu Ser Phe Asp Ser Ser Tyr Tyr
245
Ser Leu Val Ala Arg Arg Gly Leu Phe His Ser Asp Ala Ala Leu
260
Leu Thr Asp Pro Ala Thr Arg Ala Tyr Val Glu Arg Glu Ala Thr Gly
275
Leu Phe Thr Ala Glu Phe Arg Asp Phe Ala Asp Ser Met Val Lys
290
Met Ser Thr Ile Asp Val Leu Thr Gly Glu Glu Glu Ile Arg
305
Lys Lys Cys Asn Leu Val Asn
325

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<211> 1451
<212> DNA
<213> Zea mays
<220>
<221> CDS

205	agc cgc cct gct ggc ggc gac ctg tcc gtg tac ttc cac gcg gac tcg	Ser Arg Pro Ala Ala Gly Asp Leu Ser Val Tyr Phe His Ala Asp Ser	35	45	
253	tgc ccg cag cag ctg gag acg atc gtg cgg tcc agc gtg gag gcg gcg ctc	Cys Pro Gln Leu Gln Thr Ile Val Arg Ser Ser Val Asp Ala Leu	50	60	
301	cag cag aac gtc cgt ctg acg gcg ggt ctc ctc cgc ctc ctg ttg ttc cac	Gln Gln Asn Val Arg Leu Thr Ala Gly Leu Leu Arg Leu Leu Phe His	65	75	80
349	gac tgc ttc cag ggc tgc gac ggc tcc atc ctc ctg gac aac ggc	Asp Cys Phe Pro Gln Gly Cys Asp Ala Ser Ile Leu Leu Asp Asn Gly	85	90	95
397	gag cgc ggc ctc ccg ccc aac gtg ggg ctg cag cag gag ggc gtg cag	Glu Arg Gly Leu Pro Asn Val Gly Leu Gln Gln Gln Ala Val Gln	100	105	110
445	ctg gtg gag gac atc cgc ggg aag gtg cac gcg gcg tgc ggg ccc acc	Leu Val Gln Asp Ile Arg Gly Lys Val His Ala Ala Cys Gly Pro Thr	115	120	125
493	gtg tgc tgc ggc gac atc acg gtg gtc ggc acc cgc gac ggc gtg agc	Val Ser Cys Ala Asp Ile Thr Val Leu Ala Thr Arg Asp Ala Val Ser	130	135	140
541	ctg tcc ggc ggg cct tcc ttc acg gtg ccg ctg ggg ctg ggg ctg gac agc	Leu Ser Gly Gly Pro Ser Phe Thr Val Pro Leu Gly Arg Leu Asp Ser	145	150	155
589	gcg gcg cag ccg gcg tcc agc aac gac gtg ttc acg ctg ccg ccg ccg ccg	Ala Ala Pro Ala Ser Ser Asn Asp Val Phe Thr Leu Pro Pro Thr	165	170	175
637	gcg acg gtg gac gag ctg acg gcg gtc ggc ttc ggg agc aag aac ctg tcg	Ala Thr Val Asp Gln Leu Leu Thr Ala Phe Gly Ser Lys Asn Leu Ser	180	185	190
685	gac ccg cag gac ctg gtg gcg gac ctg gtg gcg ggc ggc cac acg gtg ggg aag	Asp Pro Ala Asp Leu Val Ala Leu Ser Gly Ala His Thr Val Gly Lys	195	200	205
733	gcg cag tgc agc tgc ttg ggc gac gac gtg gcg ggc ggc ggc acc gac gac	Ala Arg Cys Ser Ser Phe Gly Asp Val Ala Gly Pro Ala Thr Asp Asp	210	215	220
781	gtg acg cag cgg tgc gtg acg gcg gac gtg acg tgc tgc ggc ggc ccc ggg agc ggc gac	Val Thr Arg Cys Val Thr Ala Thr Cys Ser Ala Pro Gly Ser Gly Asp	225	230	235
829	acg ctg cgg gac ctg gac ttc ctg acg ccc ggc gtc gtc gac aac ctc	Thr Leu Arg Asp Leu Asp Phe Leu Thr Pro Ala Val Phe Asp Asn Leu	245	250	255

877	tac ttc gtc gag ctg acg ctg agg aag aac aag ggg gtc atg ccg	Tyr phe Val Gln Leu Thr Leu Arg Lys Asn Lys Gly Val Met Leu Pro	260	265	270
925	tcg gac cag ggg ctg gtc agc gac ccg acg acg agc tgg ctg cag	Ser Asp Gln Gly Leu Val Ser Asp Pro Arg Thr Ser Trp Leu Val Gln	275	280	285
973	ggc ttc gcc gac aac cac tgg tgg ttc gac cag ttc agg acc tcc	Gly phe Ala Asp Asn His Trp Trp phe phe Asp Gln phe Arg Thr Ser	290	295	300
1021	atg atc aag atg agc cag ctg agg gga ccc cag ggg aac gtc ggc gag	Met Ile Lys Met Ser Gln Leu Arg Gly Pro Gln Gly Asn Val Gly Gln	305	310	315
1069	atc cgc cgt aac tgc ttc cgc cca aac acc aac ggc atc gcc gcc tct	Ile Arg Arg Asn Cys phe Arg Pro Asn Thr Asn Gly Ile Ala Ala Ser	325	330	335
1125	gct tga gttgactgac caggcaccga tccattactt cacttcact gtgtgtaata	Ala *			
1185	attaataata ataacaaca aacaacgccg gcccgtaagt ggcgtgtgag gggggcagct				
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Cys Pro Gln Leu Gln Thr Ile Val Arg Ser Ser Val Asp Ala Ala Leu	50	55	60		
Gln Gln Asn Val Arg Leu Thr Ala Gly Leu Leu Arg Leu Leu phe His	65	70	75		
Asp Cys phe Pro Gln Gly Cys Asp Ala Ser Ile Leu Leu Asp Asn Gly	85	90	95		
Gln Arg Gly Leu Pro Asn Val Gly Leu Gln Gln Gln Ala Val Gln	100	105	110		
Leu Val Gln Asp Ile Arg Gly Lys Val His Ala Ala Cys Gly Pro Thr	115	120	125		
Val Ser Cys Ala Asp Ile Thr Val Leu Ala Thr Arg Asp Ala Val Ser	130	135	140		
Leu Ser Gly Gly Pro Ser phe Thr Val Pro Leu Gly Arg Leu Asp Ser	145	150	155		
Ala Ala Pro Ala Ser Ser Asn Asp Val phe Thr Leu Pro Pro Pro Thr	160				

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Ala	Arg	Cys	Ser	Ser	phe	Gly	Asp	Val	Ala	Gly	Pro	Ala	Thr	Asp	Asp	210	
Val	Thr	Arg	Cys	Val	Thr	Ala	Thr	Cys	Ser	Ala	Pro	Gly	Ser	Gly	Asp	215	
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240	Thr	Leu	Arg	Asp	Leu	Asp	phe	Leu	Thr	Pro	Ala	Val	phe	Asp	Asn	Leu	240
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260	Ser	Asp	Gln	Gly	Leu	Val	Ser	Asp	Pro	Arg	Thr	Ser	Trp	Leu	Val	Gln	260
265	Ser	Asp	Gln	Gly	Leu	Val	Ser	Asp	Pro	Arg	Thr	Ser	Trp	Leu	Val	Gln	265
270	Ser	Asp	Gln	Gly	Leu	Val	Ser	Asp	Pro	Arg	Thr	Ser	Trp	Leu	Val	Gln	270
275	Ser	Asp	Gln	Gly	Leu	Val	Ser	Asp	Pro	Arg	Thr	Ser	Trp	Leu	Val	Gln	275
280	Ser	Asp	Gln	Gly	Leu	Val	Ser	Asp	Pro	Arg	Thr	Ser	Trp	Leu	Val	Gln	280
285	Ser	Asp	Gln	Gly	Leu	Val	Ser	Asp	Pro	Arg	Thr	Ser	Trp	Leu	Val	Gln	285
290	Gly	phe	Ala	Asp	Asn	His	Trp	Trp	phe	phe	Asp	Gln	phe	Arg	Thr	Ser	290
295	Gly	phe	Ala	Asp	Asn	His	Trp	Trp	phe	phe	Asp	Gln	phe	Arg	Thr	Ser	295
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330	Met	Le	Lys	Met	Ser	Gln	Leu	Arg	Gly	Pro	Gln	Gly	Asn	Val	Gly	Glu	330
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Met Ala Ser Ser Val
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Gln Leu Ser Pro Thr Phe Tyr Asp Ser Ser Cys Pro Asn Ala Leu Ser

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Thr Ile Lys Ser Ala Val Asn Ala Ala Val Gln Lys Gln Asn Arg Met

305 999 ggc tcc ttc ctc agg ctc gac cat ttc cat gac tgc ttc gtc cag 999
Gly Ala Ser Leu Leu Arg Leu His Phe His Asp Cys Phe Val Gln Gly 70

34

	Cys Asp Ala Ser Val Leu Leu Ala Asp Asn Ala Ala Thr Gly Phe Thr	75
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	gly gln gln gly ala ala pro asn ala gly ser leu arg gly phe asp	95
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449	gtc atc gcc aac atc aag gca cag gtg gag gca gtc tgc aag cag acc	105
	val ile ala asn ile lys ala gln val glu ala val cys lys gln thr	110
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497	gtc tcc tgc gcc gac atc ctc gcc gtc gtc ggc ggc gct gat tcc gtc	120
	val ser cys ala asp ile leu ala val ala ala arg asp ser val val	125
		130
545	ggc ttg ggc ggc cca tca tgg acg gtc cct ctg ggg cgg agg gac tcg	135
	ala leu gly gly pro ser trp thr val pro leu gly arg arg asp ser	140
		145
593	acg acg ggc agc ctg tcc ctg ggc aac agc gac ctg ccg cct ccc ttc	150
	thr thr ala ser leu ser leu ala asn ser asp leu pro pro pro phe	155
		160
641	ttc aac ctc ggc cag ctg ata aca gcg ttc ggc aac aag ggt ttc acc	165
	phe asn leu gly gln leu ile thr ala phe gly asn lys gly phe thr	170
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689	ggc acc gag atg gcc acc ctg tcc ggc ggc cag cac acc atc ggg cag gcg	180
	ala thr glu met ala thr leu ser gly ala his thr ile gly gln ala	185
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737	cag tgc aag aac ttc agg gac cac atc tac aac gac acc aac atc aac	195
	gln cys lys asn phe arg asp his ile tyr asn asp thr asn ile asn	200
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785	cag ggc ttc gcg agc tcg ctg aag gcc aac tgc ccc ccg ccc acc ggc	210
	gln gly phe ala ser leu lys ala asn cys pro arg pro thr gly	215
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	ser gly asp gly asn leu ala pro leu asp thr thr thr pro tyr ser	230
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881	ttc gac aac gcc tac tac agc aac ctg ctg agc cag aag ggg ctg ctg	240
	phe asp asn ala tyr tyr ser asn leu leu ser gln lys gly leu leu	245
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	his ser asp gln glu leu phe asn gly gly ser thr asp asn thr val	260
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977	agg aac ttc gcg tcc aac tcg gcc ggc ttc agc agc gcc ttc gcc gcg	270
	arg asn phe ala ser asn ser ala phe ser ala phe ala ala	275
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Gln Lys Glu Asn Arg Met Gly Ala Ser Leu Leu Arg Leu His Phe His 45
Asp Cys Phe Val Gln Gly Cys Asp Ala Ser Val Leu Leu Ala Asp Asn 60
Ala Ala Thr Gly Phe Thr Gly Gln Gly Ala Pro Asn Ala Gly 75
Ser Leu Arg Gly Phe Asp Val Ile Ala Asn Ile Lys Ala Gln Val Gln 90
Ala Val Cys Lys Gln Thr Val Ser Cys Ala Asp Ile Leu Ala Val Ala 110
Ala Arg Asp Ser Val Ala Leu Gly Gly Pro Ser Trp Thr Val Pro 125
Leu Gly Arg Asp Ser Thr Ala Ser Leu Ser Leu Ala Asn Ser 140
Asp Leu Pro Pro Phe Phe Asn Leu Gly Gln Leu Ile Thr Ala Phe 160
Gly Asn Lys Gly Phe Thr Ala Thr Glu Met Ala Thr Leu Ser Gly Ala 175
His Thr Ile Gly Gln Ala Gln Cys Lys Asn Phe Arg Asp His Ile Tyr 190
Asn Asp Thr Asn Ile Asn Gln Gly Phe Ala Ser Ser Leu Lys Ala Asn 205
Cys Pro Arg Pro Thr Gly Ser Gly Asp Gly Asn Leu Ala Pro Leu Asp 220
Thr Thr Thr Pro Tyr Ser Phe Asp Asn Ala Tyr Tyr Ser Asn Leu Leu 235
Ser Gln Lys Gly Leu Leu His Ser Asp Gln Gln Leu Phe Asn Gly Gly 255
Ser Thr Asp Asn Thr Val Arg Asn Phe Ala Ser Asn Ser Ala Ala Phe 270
Ser Ser Ala Phe Ala Met Val Lys Met Gly Asn Leu Ser Ser Pro 285
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ctg atg gcg acg ggg ctg cgc gcg cag ctg cgt gtg ggc ttc tac gac 96

Leu Met Ala Thr Gly Leu Arg Ala Gln Leu Arg Val Gly Phe Tyr Asp

15

20

25

30

agc tcg tgc cca gcg gcg gag atc atc gtg cag cag gag gtg agc agg 144

Ser Ser Cys Pro Ala Ala Glu Ile Ile Val Gln Gln Glu Val Ser Arg

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40

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gcg gtg gcg gcc aac ccg ggc ctc gcc gcc ggc ctg ctc cgc ctc cac 192

Ala Val Ala Ala Asn Pro Gly Leu Ala Ala Gly Leu Leu Arg Leu His

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55

60

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Phe His Asp Cys Phe Val Gly Gly Cys Asp Ala Ser Val Leu Ile Asp

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Ser Thr Lys Gly Asn Thr Ala Glu Lys Asp Ala Gly Pro Asn Leu Ser

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Leu Arg Gly Phe Glu Val Val Asp Arg Ile Lys Ala Arg Val Glu Gln

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100

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150

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ctg ccg ccg ccg acg gcc aac gtc gcg cag ctc acg cag atc ttc ggc 528

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acc atc ggc tcc tcg cac tgc agc tcc ttc agc ggc cgg ctg tcg ggg 624
 Thr Ile Gly Ser Ser His Cys Ser Ser Phe Ser Gly Arg Leu Ser Gly
 195 200 205

tcg gcc acg acg gcg ggc ggg cag gac ccg acc atg gac ccg gcg tac 672
 Ser Ala Thr Thr Ala Gly Gly Gln Asp Pro Thr Met Asp Pro Ala Tyr
 210 215 220

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 Pro Met Asp Tyr Val Ser Pro Asn Ala Phe Asp Glu Gly Phe Tyr Lys
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 Ser Asp Lys Asn Thr Ala Val Gln Val Val Thr Tyr Ala Asn Asp Pro
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gcc acc ttc cag gcc gac ttc gcc gcc gcc atg gtc aag atg ggc tcc 912
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gtc gcc tga tccatcatca tcattcactc gtgtggagtt gtagattcgt 1009
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 35 40 45
 Ala Ala Asn Pro Gly Leu Ala Ala Gly Leu Leu Arg Leu His Phe His

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	Gly	Phe	Glu	Val	Val	Asp	Arg	Ile	Lys	Ala	Arg	Val	Glu	Gln	Ala	Cys
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	Phe	Gly	Val	Val	Ser	Cys	Ala	Asp	Ile	Leu	Ala	Phe	Ala	Ala	Arg	Asp
				115				120					125			
	Ser	Val	Ala	Leu	Ala	Gly	Gly	Asn	Ala	Tyr	Gln	Val	Pro	Ala	Gly	Arg
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	Arg	Asp	Gly	Ser	Val	Ser	Arg	Ala	Ser	Asp	Thr	Asn	Gly	Asn	Leu	Pro
145						150					155					160
	Pro	Pro	Thr	Ala	Asn	Val	Ala	Gln	Leu	Thr	Gln	Ile	Phe	Gly	Thr	Lys
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	Gly	Leu	Thr	Gln	Lys	Glu	Met	Val	Ile	Leu	Ser	Gly	Ala	His	Thr	Ile
				180					185					190		
	Gly	Ser	Ser	His	Cys	Ser	Ser	Phe	Ser	Gly	Arg	Leu	Ser	Gly	Ser	Ala
				195				200					205			
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	Gln	Leu	Ala	Arg	Gln	Cys	Pro	Gln	Gly	Gly	Asp	Pro	Leu	Val	Pro	Met
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	Asp	Tyr	Val	Ser	Pro	Asn	Ala	Phe	Asp	Glu	Gly	Phe	Tyr	Lys	Gly	Val
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	Met	Ser	Asn	Arg	Gly	Leu	Leu	Ser	Ser	Asp	Gln	Ala	Leu	Leu	Ser	Asp
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	Lys	Asn	Thr	Ala	Val	Gln	Val	Val	Thr	Tyr	Ala	Asn	Asp	Pro	Ala	Thr
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	Phe	Gln	Ala	Asp	Phe	Ala	Ala	Ala	Met	Val	Lys	Met	Gly	Ser	Val	Gly
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	Met Ala Arg Ala Gly
	1 5
ggc ggc ggt ccg gtc cgc ggc gcg gcg ctg gtg gtc gtg ctg cta ggc	162
Gly Gly Gly Pro Val Arg Gly Ala Ala Leu Val Val Val Leu Leu Gly	
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atc gtc gtg ggc gcg gcg agg gct cag ctg cgg cag aac tac tac ggc	210
Ile Val Val Gly Ala Ala Arg Ala Gln Leu Arg Gln Asn Tyr Tyr Gly	
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Phe His Asp Cys Phe Val Arg Gly Cys Asp Ala Ser Val Met Leu Met	
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Ala Leu Pro Gly Cys Ala Gly Lys Val Ser Cys Ala Asp Ile Leu Ala	
120 125 130	
atg gcc gca cgt gac gtc gtc tcc ctg ctg ggc ggt ccg agc tac ggc	546
Met Ala Ala Arg Asp Val Val Ser Leu Leu Gly Gly Pro Ser Tyr Gly	
135 140 145	
gtg gag ctg ggg cgg ctg gac ggc aag acg ttc aac agg gcc atc gtg	594
Val Glu Leu Gly Arg Leu Asp Gly Lys Thr Phe Asn Arg Ala Ile Val	
150 155 160 165	
aag cac gtc ctc ccg ggc ccc ggc ttc aac ctg gac cag ctc aac gcc	642
Lys His Val Leu Pro Gly Pro Gly Phe Asn Leu Asp Gln Leu Asn Ala	
170 175 180	
ctc ttc gcg cag aac ggc ctc acg cag acg gac atg atc gcg ctc tca	690
Leu Phe Ala Gln Asn Gly Leu Thr Gln Thr Asp Met Ile Ala Leu Ser	
185 190 195	
ggc gcg cac acg atc ggg gtg acg cac tgc gac aag ttc gtg cgg cgg	738
Gly Ala His Thr Ile Gly Val Thr His Cys Asp Lys Phe Val Arg Arg	
200 205 210	
atc tac acg ttc aag cag cgg ctg gcg tgg aac ccg ccg atg aac ctg	786
Ile Tyr Thr Phe Lys Gln Arg Leu Ala Trp Asn Pro Pro Met Asn Leu	
215 220 225	
gac ttc ctg cgc tcg ctg cgg cgg gtg tgc ccc ctc agc tac agc ccc	834
Asp Phe Leu Arg Ser Leu Arg Arg Val Cys Pro Leu Ser Tyr Ser Pro	
230 235 240 245	
acg gcg ttc gcc atg ctg gac gtc acc acg ccc agg gtc ttc gac aac	882
Thr Ala Phe Ala Met Leu Asp Val Thr Thr Pro Arg Val Phe Asp Asn	
250 255 260	

gcc tac ttc aac aac ctc cgc tac aac aag ggc ctg ctc gcc tcc gac 930
Ala Tyr Phe Asn Asn Leu Arg Tyr Asn Lys Gly Leu Leu Ala Ser Asp
265 270 275

cag gtg ctc ttc acc gac cgc cgc tcc cga ccc acc gtc aac ctc ttc 978
Gln Val Leu Phe Thr Asp Arg Arg Ser Arg Pro Thr Val Asn Leu Phe
280 285 290

gcc gcc aac gcc acc gcc ttc tac gag gca ttc gtc gcc gcc atg gcc 1026
Ala Ala Asn Ala Thr Ala Phe Tyr Glu Ala Phe Val Ala Ala Met Ala
295 300 305

aag ctc ggc agg atc ggc ctc aag acc ggc gcc gac ggc gag ata cgc 1074
Lys Leu Gly Arg Ile Gly Leu Lys Thr Gly Ala Asp Gly Glu Ile Arg
310 315 320 325

cgc gtc tgc acc gcc gtc aac taa gcctgcattg gctgcttgct gcttgcgctgc 1128
Arg Val Cys Thr Ala Val Asn *
330

gtgggtttca cttatttcac ttcttctttc tcttgtttat atacgtacgt ttgtcggatg 1188
gattttggta gccatgagat gacatccttg ctctgagcta gcggacctgc cccgattgga 1248
tgatatagat tgatccagat gttcttctaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1308
aa 1310

<210> 31
<211> 332
<212> PRT
<213> Zea mays

<400> 31
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Val Val Leu Leu Gly Ile Val Val Gly Ala Ala Arg Ala Gln Leu Arg
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Gln Asn Tyr Tyr Gly Ser Ser Cys Pro Ser Ala Glu Ser Thr Val Arg
35 40 45
Ser Val Ile Ser Gln Arg Leu Gln Gln Ser Phe Ala Val Gly Pro Gly
50 55 60
Thr Leu Arg Leu Phe Phe His Asp Cys Phe Val Arg Gly Cys Asp Ala
65 70 75 80
Ser Val Met Leu Met Ala Pro Asn Gly Asp Asp Glu Ser His Ser Gly
85 90 95
Ala Asp Ala Thr Leu Ser Pro Asp Ala Val Asp Ala Ile Asn Lys Ala
100 105 110
Lys Ala Ala Val Glu Ala Leu Pro Gly Cys Ala Gly Lys Val Ser Cys
115 120 125
Ala Asp Ile Leu Ala Met Ala Ala Arg Asp Val Val Ser Leu Leu Gly
130 135 140
Gly Pro Ser Tyr Gly Val Glu Leu Gly Arg Leu Asp Gly Lys Thr Phe
145 150 155 160
Asn Arg Ala Ile Val Lys His Val Leu Pro Gly Pro Gly Phe Asn Leu
165 170 175
Asp Gln Leu Asn Ala Leu Phe Ala Gln Asn Gly Leu Thr Gln Thr Asp
180 185 190
Met Ile Ala Leu Ser Gly Ala His Thr Ile Gly Val Thr His Cys Asp
195 200 205

Lys Phe Val Arg Arg Ile Tyr Thr Phe Lys Gln Arg Leu Ala Trp Asn
 210 215 220
 Pro Pro Met Asn Leu Asp Phe Leu Arg Ser Leu Arg Arg Val Cys Pro
 225 230 235 240
 Leu Ser Tyr Ser Pro Thr Ala Phe Ala Met Leu Asp Val Thr Thr Pro
 245 250 255
 Arg Val Phe Asp Asn Ala Tyr Phe Asn Asn Leu Arg Tyr Asn Lys Gly
 260 265 270
 Leu Leu Ala Ser Asp Gln Val Leu Phe Thr Asp Arg Arg Ser Arg Pro
 275 280 285
 Thr Val Asn Leu Phe Ala Ala Asn Ala Thr Ala Phe Tyr Glu Ala Phe
 290 295 300
 Val Ala Ala Met Ala Lys Leu Gly Arg Ile Gly Leu Lys Thr Gly Ala
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 Asp Gly Glu Ile Arg Arg Val Cys Thr Ala Val Asn
 325 330

<210> 32
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 <212> DNA
 <213> Zea mays

<220>
 <221> CDS
 <222> (25) ... (1092)

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 Met Tyr Thr Ala Met Ala Ala Arg Pro
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ctg ctt ctt ccc cct ccg gtc ctc ctc ctc ctg gtg gtg ctg gct gct 99
 Leu Leu Leu Pro Pro Pro Val Leu Leu Leu Leu Val Val Leu Ala Ala
 10 15 20 25

tcg tcg gcc gcc cat ggc tac ggc gcc tac ggc tac ggc gac gct gct 147
 Ser Ser Ala Ala His Gly Tyr Gly Ala Tyr Gly Tyr Gly Asp Ala Ala
 30 35 40

gct gag ctc agg gtc ggg ttc tac aag gac tcg tgc ccg gac gcc gag 195
 Ala Glu Leu Arg Val Gly Phe Tyr Lys Asp Ser Cys Pro Asp Ala Glu
 45 50 55

gcc gtc gtc cgc agg atc gtc gcc aag gcc gtc caa gag gac ccc acg 243
 Ala Val Val Arg Arg Ile Val Ala Lys Ala Val Gln Glu Asp Pro Thr
 60 65 70

gcc aac gcg ccg ctg ctc agg ctc cac ttc cac gac tgc ttc gtc cgg 291
 Ala Asn Ala Pro Leu Leu Arg Leu His Phe His Asp Cys Phe Val Arg
 75 80 85

ggc tgc gac ggc tcc gtg ctc gtc aac tcc acc agg ggg aac acg gcg 339
 Gly Cys Asp Gly Ser Val Leu Val Asn Ser Thr Arg Gly Asn Thr Ala
 90 95 100 105

gag aag gac gcc aag ccc aac cac acg ctg gac gcc ttc gac gtc atc 387

Glu	Lys	Asp	Ala	Lys	Pro	Asn	His	Thr	Leu	Asp	Ala	Phe	Asp	Val	Ile		
				110					115					120			
gac	gac	atc	aag	gag	gcg	ctg	gag	aag	cgc	tgc	ccg	ggg	acc	gtc	tcc		435
Asp	Asp	Ile	Lys	Glu	Ala	Leu	Glu	Lys	Arg	Cys	Pro	Gly	Thr	Val	Ser		
			125					130					135				
tgc	gcc	gac	atc	ctc	gcc	atc	gcc	gcc	agg	gac	gcc	gtc	tcg	ctg	gcc		483
Cys	Ala	Asp	Ile	Leu	Ala	Ile	Ala	Ala	Arg	Asp	Ala	Val	Ser	Leu	Ala		
			140				145					150					
acc	aag	gtg	gtg	acc	aag	ggc	ggc	tgg	agc	agg	gac	ggc	aac	ctc	tac		531
Thr	Lys	Val	Val	Thr	Lys	Gly	Gly	Trp	Ser	Arg	Asp	Gly	Asn	Leu	Tyr		
	155					160					165						
cag	gtg	gag	acc	ggc	agg	cgg	gac	ggc	cgc	gtg	tcc	aga	gcc	aag	gag		579
Gln	Val	Glu	Thr	Gly	Arg	Arg	Asp	Gly	Arg	Val	Ser	Arg	Ala	Lys	Glu		
	170				175					180					185		
gcc	gtc	aag	aac	ttg	ccg	gac	tcc	atg	gat	ggc	atc	cgc	aag	ctc	atc		627
Ala	Val	Lys	Asn	Leu	Pro	Asp	Ser	Met	Asp	Gly	Ile	Arg	Lys	Leu	Ile		
				190					195					200			
agg	agg	ttc	gct	tcc	aag	aac	ctc	agc	gtc	aag	gat	ctc	gct	gtt	ctc		675
Arg	Arg	Phe	Ala	Ser	Lys	Asn	Leu	Ser	Val	Lys	Asp	Leu	Ala	Val	Leu		
			205					210					215				
tca	ggc	gcc	cac	gcg	atc	ggc	aaa	tcg	cac	tgc	ccg	tcg	atc	gcc	aag		723
Ser	Gly	Ala	His	Ala	Ile	Gly	Lys	Ser	His	Cys	Pro	Ser	Ile	Ala	Lys		
			220				225					230					
cgg	ctg	cgc	aac	ttc	acg	gcg	cac	cgg	gac	agc	gac	ccg	acc	ctg	gac		771
Arg	Leu	Arg	Asn	Phe	Thr	Ala	His	Arg	Asp	Ser	Asp	Pro	Thr	Leu	Asp		
	235					240					245						
ggc	gcg	tac	gcg	gcg	gag	ctg	agg	cgg	cag	tgc	cgg	agg	cgc	agg	gac		819
Gly	Ala	Tyr	Ala	Ala	Glu	Leu	Arg	Arg	Gln	Cys	Arg	Arg	Arg	Arg	Asp		
	250				255				260					265			
aac	acg	acg	gag	ctg	gag	atg	gtg	ccg	ggg	agc	tcc	acc	gcg	ttc	ggc		867
Asn	Thr	Thr	Glu	Leu	Glu	Met	Val	Pro	Gly	Ser	Ser	Thr	Ala	Phe	Gly		
				270					275				280				
acg	gcc	tac	tac	ggc	ctg	gtc	gcg	gag	cgg	agg	gcg	ctc	ttc	cac	tcc		915
Thr	Ala	Tyr	Tyr	Gly	Leu	Val	Ala	Glu	Arg	Arg	Ala	Leu	Phe	His	Ser		
				285				290					295				
gac	gag	gcg	ctg	ctc	agg	aac	ggg	gag	acc	agg	gcg	ctc	gtc	tac	cgc		963
Asp	Glu	Ala	Leu	Leu	Arg	Asn	Gly	Glu	Thr	Arg	Ala	Leu	Val	Tyr	Arg		
			300				305					310					
tat	agg	gac	gcg	ccg	tcc	gag	gcg	gcg	ttc	ctc	gcg	gaa	ttc	ggg	gcg		1011
Tyr	Arg	Asp	Ala	Pro	Ser	Glu	Ala	Ala	Phe	Leu	Ala	Glu	Phe	Gly	Ala		
	315					320					325						
tcc	atg	ctc	aac	atg	ggc	agg	gtg	ggc	gtg	ctc	acc	ggc	gcc	cag	ggg		1059
Ser	Met	Leu	Asn	Met	Gly	Arg	Val	Gly	Val	Leu	Thr	Gly	Ala	Gln	Gly		

330

335

340

345

gag atc agg aag agg tgc gcc ttt gtc aac tag ctagcgatat gctggattgt 1112
 Glu Ile Arg Lys Arg Cys Ala Phe Val Asn *

350

355

actttgtacc ctctcgccctt aattaaaaatt taaatgctgg agtttcacct aaaaaaaaa 1170

<210> 33

<211> 355

<212> PRT

<213> Zea mays

<400> 33

Met Tyr Thr Ala Met Ala Ala Arg Pro Leu Leu Leu Pro Pro Pro Val
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 Leu Leu Leu Leu Val Val Leu Ala Ala Ser Ser Ala Ala His Gly Tyr
 20 25 30
 Gly Ala Tyr Gly Tyr Gly Asp Ala Ala Ala Glu Leu Arg Val Gly Phe
 35 40 45
 Tyr Lys Asp Ser Cys Pro Asp Ala Glu Ala Val Val Arg Arg Ile Val
 50 55 60
 Ala Lys Ala Val Gln Glu Asp Pro Thr Ala Asn Ala Pro Leu Leu Arg
 65 70 75 80
 Leu His Phe His Asp Cys Phe Val Arg Gly Cys Asp Gly Ser Val Leu
 85 90 95
 Val Asn Ser Thr Arg Gly Asn Thr Ala Glu Lys Asp Ala Lys Pro Asn
 100 105 110
 His Thr Leu Asp Ala Phe Asp Val Ile Asp Asp Ile Lys Glu Ala Leu
 115 120 125
 Glu Lys Arg Cys Pro Gly Thr Val Ser Cys Ala Asp Ile Leu Ala Ile
 130 135 140
 Ala Ala Arg Asp Ala Val Ser Leu Ala Thr Lys Val Val Thr Lys Gly
 145 150 155 160
 Gly Trp Ser Arg Asp Gly Asn Leu Tyr Gln Val Glu Thr Gly Arg Arg
 165 170 175
 Asp Gly Arg Val Ser Arg Ala Lys Glu Ala Val Lys Asn Leu Pro Asp
 180 185 190
 Ser Met Asp Gly Ile Arg Lys Leu Ile Arg Arg Phe Ala Ser Lys Asn
 195 200 205
 Leu Ser Val Lys Asp Leu Ala Val Leu Ser Gly Ala His Ala Ile Gly
 210 215 220
 Lys Ser His Cys Pro Ser Ile Ala Lys Arg Leu Arg Asn Phe Thr Ala
 225 230 235 240
 His Arg Asp Ser Asp Pro Thr Leu Asp Gly Ala Tyr Ala Ala Glu Leu
 245 250 255
 Arg Arg Gln Cys Arg Arg Arg Arg Asp Asn Thr Thr Glu Leu Glu Met
 260 265 270
 Val Pro Gly Ser Ser Thr Ala Phe Gly Thr Ala Tyr Tyr Gly Leu Val
 275 280 285
 Ala Glu Arg Arg Ala Leu Phe His Ser Asp Glu Ala Leu Leu Arg Asn
 290 295 300
 Gly Glu Thr Arg Ala Leu Val Tyr Arg Tyr Arg Asp Ala Pro Ser Glu
 305 310 315 320
 Ala Ala Phe Leu Ala Glu Phe Gly Ala Ser Met Leu Asn Met Gly Arg
 325 330 335
 Val Gly Val Leu Thr Gly Ala Gln Gly Glu Ile Arg Lys Arg Cys Ala

Phe Val Asn 340
355

345

350

<210> 34
<211> 1391
<212> DNA
<213> Zea mays

<220>
<221> CDS
<222> (103)...(1089)

<400> 34

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gtaccagca gcagctagca ctagcagtc atcgagcga cg atg gtg aga agg 114
Met Val Arg Arg
1

acg gtg ctg gcg gcg ctg ctg gtg gcc gcc gcc ctc gcc ggc ggc gcg 162
Thr Val Leu Ala Ala Leu Leu Val Ala Ala Ala Leu Ala Gly Gly Ala
5 10 15 20

cgg gcg cag ctc aag gag ggg ttc tac gac tac tcc tgc cca cag gcg 210
Arg Ala Gln Leu Lys Glu Gly Phe Tyr Asp Tyr Ser Cys Pro Gln Ala
25 30 35

gag aag atc gtc aag gac tac gtg aag gcg cac atc ccc cac gcg ccc 258
Glu Lys Ile Val Lys Asp Tyr Val Lys Ala His Ile Pro His Ala Pro
40 45 50

gac gtc gcc tcc acc ctg ctc cgc acc cac ttc cac gac tgc ttc gtc 306
Asp Val Ala Ser Thr Leu Leu Arg Thr His Phe His Asp Cys Phe Val
55 60 65

agg ggc tgc gac gcg tca gtg ctg ctc aac gcg acg ggc ggc agc gag 354
Arg Gly Cys Asp Ala Ser Val Leu Leu Asn Ala Thr Gly Gly Ser Glu
70 75 80

gcg gag aag gac gcg gcg ccc aac ctg acg ctg cgc ggc ttc ggc ttc 402
Ala Glu Lys Asp Ala Ala Pro Asn Leu Thr Leu Arg Gly Phe Gly Phe
85 90 95 100

atc gac cgc atc aag gcg ctg ctc gag aag gag tgc ccc ggc gtg gtg 450
Ile Asp Arg Ile Lys Ala Leu Leu Glu Lys Glu Cys Pro Gly Val Val
105 110 115

tcc tgc gcc gac atc gtc gcg ctc gcc gcc cgc gac tcc gtc ggc gtc 498
Ser Cys Ala Asp Ile Val Ala Leu Ala Ala Arg Asp Ser Val Gly Val
120 125 130

atc ggc ggt ccg ttc tgg agc gtg ccg acg ggg agg cgc gac ggc acc 546
Ile Gly Gly Pro Phe Trp Ser Val Pro Thr Gly Arg Arg Asp Gly Thr
135 140 145

gtg tcc atc aag cag gag gcg ctg gac cag atc ccc gcg ccc acc atg 594

Val	Ser	Ile	Lys	Gln	Glu	Ala	Leu	Asp	Gln	Ile	Pro	Ala	Pro	Thr	Met	
150						155					160					
aac	ttc	acc	caa	ctc	ctc	cag	tcc	ttc	cag	aac	aag	agc	ctc	aac	ctc	642
Asn	Phe	Thr	Gln	Leu	Leu	Gln	Ser	Phe	Gln	Asn	Lys	Ser	Leu	Asn	Leu	
165					170					175					180	
gcc	gac	ctc	gtc	tgg	ctc	tca	ggg	gct	cac	acg	atc	ggc	atc	tcc	caa	690
Ala	Asp	Leu	Val	Trp	Leu	Ser	Gly	Ala	His	Thr	Ile	Gly	Ile	Ser	Gln	
				185					190					195		
tgc	aac	tcc	ttc	agc	gag	cgc	ctg	tac	aac	ttc	acg	ggg	cgc	ggc	ggg	738
Cys	Asn	Ser	Phe	Ser	Glu	Arg	Leu	Tyr	Asn	Phe	Thr	Gly	Arg	Gly	Gly	
			200					205					210			
ccc	gac	gac	gcg	gac	ccg	tcg	ctg	gac	ccg	ctg	tac	gcc	gcg	aag	ttg	786
Pro	Asp	Asp	Ala	Asp	Pro	Ser	Leu	Asp	Pro	Leu	Tyr	Ala	Ala	Lys	Leu	
			215				220					225				
cgg	ctc	aag	tgc	aag	acg	ctg	acg	gac	aac	acg	acg	atc	gtg	gag	atg	834
Arg	Leu	Lys	Cys	Lys	Thr	Leu	Thr	Asp	Asn	Thr	Thr	Ile	Val	Glu	Met	
			230			235					240					
gac	ccc	ggc	agc	ttc	cgc	acc	ttc	gac	ctg	agc	tac	tac	cgc	ggc	gtg	882
Asp	Pro	Gly	Ser	Phe	Arg	Thr	Phe	Asp	Leu	Ser	Tyr	Tyr	Arg	Gly	Val	
					250					255					260	
ctc	aag	cgg	cgg	ggc	ctg	ttc	cag	tcc	gac	gcc	gcg	ctc	atc	acc	gac	930
Leu	Lys	Arg	Arg	Gly	Leu	Phe	Gln	Ser	Asp	Ala	Ala	Leu	Ile	Thr	Asp	
				265					270					275		
gcc	gcc	tcc	aag	gcc	gac	atc	ctc	agc	gtg	atc	aac	gcg	ccg	ccc	gag	978
Ala	Ala	Ser	Lys	Ala	Asp	Ile	Leu	Ser	Val	Ile	Asn	Ala	Pro	Pro	Glu	
			280				285					290				
gtg	ttc	ttc	cag	gtc	ttc	gcg	ggc	tcc	atg	gtc	aag	atg	ggc	gcc	atc	1026
Val	Phe	Phe	Gln	Val	Phe	Ala	Gly	Ser	Met	Val	Lys	Met	Gly	Ala	Ile	
			295				300					305				
gag	gtc	aag	acc	ggc	tcc	gag	ggc	gag	atc	agg	aag	cac	tgc	gcc	ctc	1074
Glu	Val	Lys	Thr	Gly	Ser	Glu	Gly	Glu	Ile	Arg	Lys	His	Cys	Ala	Leu	
		310				315				320						
gtc	aac	aag	cac	tag	gcggcggaat	tcattgcggga	gatggctcca	ttgctcgcaa								1129
Val	Asn	Lys	His	*												
					325											
aaaaatcctt	gtgagacaca	caacatgctc	tgcattctgca	ggcgttgctg	tcaccttggt											1189
ggacgtagta	catcggtgca	tggattatct	gttggttaaat	ttgtacgttc	agttcattct											1249
gtttcttgta	ttcttttggt	tcctttcctc	ttgtttattc	atggatgatg	aggtgtttct											1309
gttttattct	ctggttcagc	tgtaacatg	taacatgtaa	ggtgcgcgtt	ttgtcctaaa											1369
aaaaaaaaaa	aaaaaaaaaa	aa														1391

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 <212> PRT
 <213> Zea mays

<400> 35
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Ala Gly Gly Ala Arg Ala Gln Leu Lys Glu Gly Phe Tyr Asp Tyr Ser
20 25 30
Cys Pro Gln Ala Glu Lys Ile Val Lys Asp Tyr Val Lys Ala His Ile
35 40 45
Pro His Ala Pro Asp Val Ala Ser Thr Leu Leu Arg Thr His Phe His
50 55 60
Asp Cys Phe Val Arg Gly Cys Asp Ala Ser Val Leu Leu Asn Ala Thr
65 70 75 80
Gly Gly Ser Glu Ala Glu Lys Asp Ala Ala Pro Asn Leu Thr Leu Arg
85 90 95
Gly Phe Gly Phe Ile Asp Arg Ile Lys Ala Leu Leu Glu Lys Glu Cys
100 105 110
Pro Gly Val Val Ser Cys Ala Asp Ile Val Ala Leu Ala Ala Arg Asp
115 120 125
Ser Val Gly Val Ile Gly Gly Pro Phe Trp Ser Val Pro Thr Gly Arg
130 135 140
Arg Asp Gly Thr Val Ser Ile Lys Gln Glu Ala Leu Asp Gln Ile Pro
145 150 155 160
Ala Pro Thr Met Asn Phe Thr Gln Leu Leu Gln Ser Phe Gln Asn Lys
165 170 175
Ser Leu Asn Leu Ala Asp Leu Val Trp Leu Ser Gly Ala His Thr Ile
180 185 190
Gly Ile Ser Gln Cys Asn Ser Phe Ser Glu Arg Leu Tyr Asn Phe Thr
195 200 205
Gly Arg Gly Gly Pro Asp Asp Ala Asp Pro Ser Leu Asp Pro Leu Tyr
210 215 220
Ala Ala Lys Leu Arg Leu Lys Cys Lys Thr Leu Thr Asp Asn Thr Thr
225 230 235 240
Ile Val Glu Met Asp Pro Gly Ser Phe Arg Thr Phe Asp Leu Ser Tyr
245 250 255
Tyr Arg Gly Val Leu Lys Arg Arg Gly Leu Phe Gln Ser Asp Ala Ala
260 265 270
Leu Ile Thr Asp Ala Ala Ser Lys Ala Asp Ile Leu Ser Val Ile Asn
275 280 285
Ala Pro Pro Glu Val Phe Phe Gln Val Phe Ala Gly Ser Met Val Lys
290 295 300
Met Gly Ala Ile Glu Val Lys Thr Gly Ser Glu Gly Glu Ile Arg Lys
305 310 315 320
His Cys Ala Leu Val Asn Lys His
325

<210> 36
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<212> DNA
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<222> (259) ... (1236)

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60

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gaggagacac tactactcac tcaagagtca agactcaaca gcagcagggg cgaccgagct	180
ctgctgtcgt ggggagaacc ggagaaggca gcagaggagg gagggaggga gcgcgtggac	240
caggctaggc gcagcagc atg ggc gcc ggg atc agg gtc ctg gcg gcg ctc	291
Met Gly Ala Gly Ile Arg Val Leu Ala Ala Leu	
1 5 10	
ttg gcg gcg ctc gcg gca gcc acc gcc ggc ctg acg gcg cag ctg cgg	339
Leu Ala Ala Leu Ala Ala Ala Thr Ala Gly Leu Thr Ala Gln Leu Arg	
15 20 25	
cag gac tac tac gcg gct gtg tgc ccg gac ctg gag agc atc gtg cgc	387
Gln Asp Tyr Tyr Ala Ala Val Cys Pro Asp Leu Glu Ser Ile Val Arg	
30 35 40	
gcc gcg gtg tcc aag aag gtg cag gcg cag ccc gtc gcc gtg ggc gcc	435
Ala Ala Val Ser Lys Lys Val Gln Ala Gln Pro Val Ala Val Gly Ala	
45 50 55	
acc atc cgc ctc ttc ttc cac gac tgc ttc gtc gag ggc tgc gac gcg	483
Thr Ile Arg Leu Phe Phe His Asp Cys Phe Val Glu Gly Cys Asp Ala	
60 65 70 75	
tcg gtg atc ctg gtg tcc acg ggg aac aac acg gcg gag aag gac cac	531
Ser Val Ile Leu Val Ser Thr Gly Asn Asn Thr Ala Glu Lys Asp His	
80 85 90	
ccg agc aac ctc tcc ctg gcc ggc gac ggc ttc gac acc gtc atc cag	579
Pro Ser Asn Leu Ser Leu Ala Gly Asp Gly Phe Asp Thr Val Ile Gln	
95 100 105	
gcc aag gcg gcc gtg gac gcc gtg ccg gcg tgc gcc aac cag gtg tcg	627
Ala Lys Ala Ala Val Asp Ala Val Pro Ala Cys Ala Asn Gln Val Ser	
110 115 120	
tgc gcc gac atc ctg gcg ctg gcc acc ccg gac gtc att gag ctg gct	675
Cys Ala Asp Ile Leu Ala Leu Ala Thr Arg Asp Val Ile Glu Leu Ala	
125 130 135	
ggc ggg ccg tcg tac gcg gtg gag ctg ggg agg ctg gac ggg ctg gtg	723
Gly Gly Pro Ser Tyr Ala Val Glu Leu Gly Arg Leu Asp Gly Leu Val	
140 145 150 155	
tcc atg tcc acc aac gtc gac ggc aag ctg ccg ccg ccg tcc ttc aac	771
Ser Met Ser Thr Asn Val Asp Gly Lys Leu Pro Pro Pro Ser Phe Asn	
160 165 170	
ctg gac cag ctg acg agc att ttc gcc ctc aac aac ctg tcg cag gcc	819
Leu Asp Gln Leu Thr Ser Ile Phe Ala Leu Asn Asn Leu Ser Gln Ala	
175 180 185	
gac atg att gct tta tct gcg gcg cac acg gtg ggg ttc gcg cac tgc	867
Asp Met Ile Ala Leu Ser Ala Ala His Thr Val Gly Phe Ala His Cys	
190 195 200	
agc acg ttc tcg gac ccg atc cag ccg cag tcg gtg gac ccg acg atg	915
Ser Thr Phe Ser Asp Arg Ile Gln Pro Gln Ser Val Asp Pro Thr Met	

205	210	215	
aac gcg acg tac gcg gag gac ctg cag gcg gcg tgc ccg gcg ggg gtg			963
Asn Ala Thr Tyr Ala Glu Asp Leu Gln Ala Ala Cys Pro Ala Gly Val			
220	225	230	235
gac ccc aac atc gcg ctg cag ctg gac ccc gtg acg ccg cag gcc ttc			1011
Asp Pro Asn Ile Ala Leu Gln Leu Asp Pro Val Thr Pro Gln Ala Phe			
	240	245	250
gac aac cag tac ttc gcc aac ctg gtg gac ggc cgg ggg ctc ttc gcc			1059
Asp Asn Gln Tyr Phe Ala Asn Leu Val Asp Gly Arg Gly Leu Phe Ala			
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Ser Asp Gln Val Leu Phe Ser Asp Ala Arg Ser Gln Pro Thr Val Val			
	270	275	280
gcg tgg gcg cag aac gcc acc gac ttc gag cag gcc ttc gtc gac gcc			1155
Ala Trp Ala Gln Asn Ala Thr Asp Phe Glu Gln Ala Phe Val Asp Ala			
	285	290	295
atc acc agg ctc ggc cgc gtc ggc gtc aag acc gac ccg tcg ctg ggg			1203
Ile Thr Arg Leu Gly Arg Val Gly Val Lys Thr Asp Pro Ser Leu Gly			
300	305	310	315
gac gtc cgc cgc gac tgc gcc ttc ctc aac tga aaaaggatga taagcgctag			1256
Asp Val Arg Arg Asp Cys Ala Phe Leu Asn *			
	320	325	
ctagtaggtg taagcatcgg ctggcactca cctggaggaa gaggccggct tttggtcagt			1316
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 35 40 45
 Lys Val Gln Ala Gln Pro Val Ala Val Gly Ala Thr Ile Arg Leu Phe
 50 55 60
 Phe His Asp Cys Phe Val Glu Gly Cys Asp Ala Ser Val Ile Leu Val
 65 70 75 80
 Ser Thr Gly Asn Asn Thr Ala Glu Lys Asp His Pro Ser Asn Leu Ser
 85 90 95
 Leu Ala Gly Asp Gly Phe Asp Thr Val Ile Gln Ala Lys Ala Ala Val
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 Asp Ala Val Pro Ala Cys Ala Asn Gln Val Ser Cys Ala Asp Ile Leu
 115 120 125

Ala	Leu	Ala	Thr	Arg	Asp	Val	Ile	Glu	Leu	Ala	Gly	Gly	Pro	Ser	Tyr
130						135					140				
Ala	Val	Glu	Leu	Gly	Arg	Leu	Asp	Gly	Leu	Val	Ser	Met	Ser	Thr	Asn
145					150					155					160
Val	Asp	Gly	Lys	Leu	Pro	Pro	Pro	Ser	Phe	Asn	Leu	Asp	Gln	Leu	Thr
			165						170					175	
Ser	Ile	Phe	Ala	Leu	Asn	Asn	Leu	Ser	Gln	Ala	Asp	Met	Ile	Ala	Leu
			180						185					190	
Ser	Ala	Ala	His	Thr	Val	Gly	Phe	Ala	His	Cys	Ser	Thr	Phe	Ser	Asp
		195					200						205		
Arg	Ile	Gln	Pro	Gln	Ser	Val	Asp	Pro	Thr	Met	Asn	Ala	Thr	Tyr	Ala
	210					215						220			
Glu	Asp	Leu	Gln	Ala	Ala	Cys	Pro	Ala	Gly	Val	Asp	Pro	Asn	Ile	Ala
225					230					235					240
Leu	Gln	Leu	Asp	Pro	Val	Thr	Pro	Gln	Ala	Phe	Asp	Asn	Gln	Tyr	Phe
			245						250					255	
Ala	Asn	Leu	Val	Asp	Gly	Arg	Gly	Leu	Phe	Ala	Ser	Asp	Gln	Val	Leu
			260					265					270		
Phe	Ser	Asp	Ala	Arg	Ser	Gln	Pro	Thr	Val	Val	Ala	Trp	Ala	Gln	Asn
		275					280						285		
Ala	Thr	Asp	Phe	Glu	Gln	Ala	Phe	Val	Asp	Ala	Ile	Thr	Arg	Leu	Gly
	290					295					300				
Arg	Val	Gly	Val	Lys	Thr	Asp	Pro	Ser	Leu	Gly	Asp	Val	Arg	Arg	Asp
305					310					315					320
Cys	Ala	Phe	Leu	Asn											
				325											